

THE ANTS OF THE CHICAGO REGION¹

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The area at the southern end of Lake Michigan is interesting ecologically for the transition between the deciduous forests and the "prairie wedge;" the latter reaches its most eastern extension in Indiana. There is also a well-marked transition between the boreal and the austral portions of the forested land, and semi-arid conditions prevail in the dune localities.

Numerous papers on the geological and ecological features of the region have been published (Salisbury and Alden, 1899; Fryxell, 1927; Cowles, 1899, 1901; Shelford, 1907, 1908, 1911, 1912, 1913; Fuller, 1914, 1925, 1934, 1935; Pepon, 1927; Peattie, 1930; O. Park, 1930, 1931 a, b, 1935, 1937; Park, Lockett and Myers, 1931; Park and Keller, 1932, Park and Sejba, 1935; Park and Strohecker, 1936; Pearson, 1933; Talbot, 1934; Strohecker, 1937 a, b, 1938; Lowrie, 1942). In addition, studies on the biology of a local aggregation of *Formica ulkei* nests have been contributed (Holmquist, 1928; O. Park, 1929; T. Park, 1929; Dreyer and Park, 1932).

The materials for this report were accumulated while the author was engaged on another program, and are largely qualitative as no exact sampling methods were employed. Yet, to one collecting a specific group in a limited area the degrees of abundance soon become evident, and from such experience an indication of the relative numbers of each species is included in the table of habitat comparisons (Table I; see also Table III). The number of places actually visited is not large, but selected localities representing sixteen major habitats have been investigated repeatedly.²

¹The excellent study by Dr. Mary Talbot on adaptive differences among certain *Formicae* and the ecological distribution of ant species in the vicinity of Chicago, Illinois, has led the author to undertake similar field studies and to record the results with the view of adding new data for the region. It is hoped this report will be of aid to those wishing identification of the local ants.

²I wish to acknowledge indebtedness to the following persons whose help has been greatly appreciated. Dr. Talbot afforded much early assistance with the taxonomy of ants and the checking of determinations. Dr. Neal A. Weber has graciously supplied the names for certain species of *Myrmica*. Dr. Donald C. Lowrie, and others whose names appear in connection with the localities collected, have added many specimens. My sincere thanks are extended to the Department of Zoology for providing various facilities, and to my wife, Ella Virginia Gregg, I am especially grateful for aid in numerous instances and for many specimens. To Mr. R. W. Miller belongs the credit for preparation of the photographs.

THE CHICAGO REGION

Prairies lie west and southwest of Chicago, and ant mounds are everywhere visible although the number of species is low. Eight species are listed but only *Formica cinerea neocinerea* is abundant, and probably ninety-five per cent of the nests are constructed by this form. *Polygerus rufescens breviceps*, one of the rarest of ants, is present locally as a parasitic (dulotic) species on this vast assemblage of *cinerea* nests.

At the junction of prairie and forest a rich parkland and savanna is found, and this is shown by the interdigitation of grasslands on the upland with trees along the watercourses. Forest margin and meadow are important habitats and such ants as the yellow *Lasius*, *Formica ulkei* and *Formica sanguinea* can be expected to occur. It may be surmised that the total amount of forest-prairie ecotone is larger than formerly, and correlated with this may be an increase in the number of ant species. Certain inhabitants of the deep woods may be rarer than when climax forests were continuous. The ant, *Proceratium silaceum*, is probably an illustration of this tendency (Kennedy and Talbot, 1939).

On the terminal and ground moraines and outwash deposits to be seen at Palos Park, Orland Park, New Lenox, Volo, Aurora, Illinois, and Lake Geneva, Wisconsin, there are stands of oak forest. Black, red and white oaks are mixed in varying proportions, and the ants *Prenolepis imparis*, *Formica fusca subaenescens*, *F. f. subsericea* and *Lasius niger alienus americanus* are common members of the community. Along streams and ravines elm and hickory are added indicating more mesic conditions (e.g., at New Lenox, Mount Forest Island at Palos and at Hadley, Illinois), and the ant *Camponotus herculeanus pennsylvanicus ferrugineus* often makes its appearance in these situations.

The oak-hickory forest is perhaps the physiographic climax for some localities, but beech seems to be restricted to the more humid stations in northern Indiana and southern Michigan. This lake-border region marks a portion of the western boundary of the beech-maple-hemlock cover type, and stands of this climax were studied at Warren Woods (Lakeside), Michigan, and at Smith, Indiana, both on mixtures of silt and clay. The ants most strikingly associated with the beech-maple forest are the several species of the *Aphaenogaster fulva* complex, *Myrmecina graminicola americana* and *Leptothorax longispinosus*.

Floodplain forests on argillaceous substrata flank the numerous rivers, and collections were made in the Salt Creek Forest Preserve of Chicago (elm and oaks), and beside Coffee Creek near Chesterton, Indiana (elm-oak-maple-basswood). The ants of this community do not differ radically from those of the oak and oak-hickory types, but the single nest of *Strumigenys pergandei* was collected from a log in the Coffee Creek woods.

The area about the head of Lake Michigan originally was one of extensive marshes, but unfortunately, much of this land has been drained. In the marshes of the Palos hills, the temporary marshes of the low prairie southwest of Chicago and in the Lake Calumet district, the prairie ant, *Formica c. neocinerea*, is the most obvious resident.

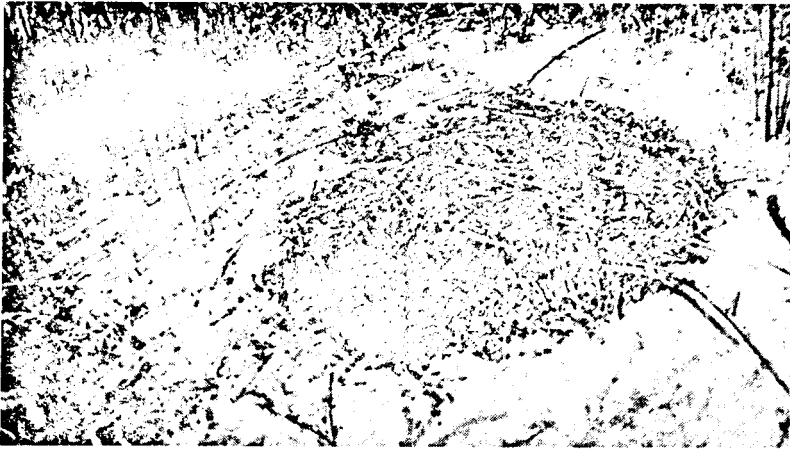


FIG. 1. Low, thatch covered mound of *Formica rufa aggerans* Wheeler in the dunes at Waukegan, Illinois. Photo by Zora Ivaska.



FIG. 2. Masonry dome of *Formica ulkei* Emery from the local aggregation of these ants at Palos Park, Illinois. Shows differential angles of slope oriented with reference to the sun; longest slope faces south. Photo by A. S. Windsor.

This may be due to its capacity for building high conical domes which could stand above the water during periodic inundation, but the author did not succeed in proving this supposition. In drier prairies, however, the mounds were much lower. In the senescent marshes of the Gary Pond Series at Hammond, Indiana, were found several nests of *Formica ulkei*, and even more astonishing were a number of large formicaries of *Lasius umbratus mixtus aphidicola* (see discussion of this species below).

Bogs are infrequent but one mid-stage tamarack bog in the lake region near Volo, Illinois, was visited several times and a senescent bog at Dune Acres, Indiana, on at least one occasion. The ant fauna of bogs is, as far as observed, rather meager, although from these the majority of *Dolichoderus* were taken. These ants nested between the leaves of dead *Typha* plants, and other species were in rotting wood. Two *Myrmicae* (*brevinodis* and *brevispinosa*) actually nested in the bog mat and could be located usually by standing at one place until the sphagnum sank causing the ants to retreat to the surface ahead of the rising water.

Three sandy areas in the Chicago Region, each with certain distinctive features, have been described at some length (Lowrie, 1942). The classical strip of dunes along the southern and eastern shore of Lake Michigan is the most diversified, and was examined at Pine, Miller, Ogden Dunes, Dune Acres (Mineral Springs), and Tremont, Indiana, and at Lakeside, Michigan. It includes substantial plant and animal successions which correlate with changing physiographic conditions progressing inland from the lake (Cowles, Shelford, O. Park, Strohecker). The typical sequence at Ogden presents three levels of beach (lower, middle and storm beach), foredunes (formed by sand-binding grasses, *Ammophila* and *Calamovilfa*), cottonwood dunes (height correlated with this species of tree), Jack and white pine pioneer woodlands or meadows of *Andropogon*, black oak woodlands and in sheltered pockets behind the high sand, mesophytic forests of red-white oak, maple, basswood, et cetera, which approach closely the beech-maple climax. Outstanding examples of ants which parallel this series are (1) *Monomorium minimum*, *Lasius niger neoniger* and *Pheidole bicarinata* on the upper beach and the two subsequent pioneer stages, (2) *Iridomyrmex pruinosus analis*, *Paratrechina parvula* and *Crematogaster lineolata* in the evergreen zone, (3) a long list of species of which the *Formica pallidefulva* group is almost diagnostic for the black oak woodland, and (4) a group of ants similar to those in the beech-maple forest with the conspicuous addition of *Lasius flavus nearcticus* and *Formica truncicola obscuriventris* in the mesophytic ravine subclimax. Some species range over two or more of the plant associates, but we can recognize the following trends. Representatives of the tropical and somewhat xerophilous genera *Monomorium* and *Pheidole* are the predominant species in the hot, semi-arid conditions of the open sand whether on the usual dune sequence or in stations where the plant cover has been removed and the dunes rejuvenated. Typical deciduous forest members increase directly with the increase of mesophytism, and an abrupt change of this sort is noted in passing from the pines into the oaks. The occasional presence of *pallidefulva* species in the pine



FIG. 3. Mixed oak forest and vernal pond at Palos Park, Illinois.
Photo by Ecology Class, 1933.



FIG. 4. The Gary Ponds. View eastward from the embankment of the Elgin, Joliet and Eastern Railroad where it crosses Highway Twelve, showing the successional series of parallel ridges and depressions formed in Lake Chicago as sand bars and land-locked pools. Photo by Ecology Class, 1938.

woods may be an indication of environmental changes among the pines which culminate in their replacement by black oaks. Many of these tendencies are observable in Table I.

At Tremont the subclimax is well developed over much of the State Park, but the succession seems to be partially destroyed by an eroding shore which has reached far enough to expose some of the mesophytic forests on old established dunes. The lush growth ends sharply above steep, lakeward slopes with foredunes at the base. At Lakeside undercutting and slumping from wave action have produced high cliffs of sand which stand sixty to eighty feet above the water. The pattern in the Indiana dunes is further complicated by blowouts in which the terrestrial succession may start anew, and if the surface has been lowered beyond the water-table, pannes of open water and marshes develop.

Near Pine, Indiana, the ant species are identical with those in the pioneer stages of the other dune localities. The series of linear ponds alternating with former sand bars of Lake Chicago is still intact, but it is lamentable the first three or four of these have been filled by steel mill wastes. As previously noted, some of the oldest ponds which are now drying cattail swamps were visited at Hammond.

In the dunes of the Kankakee River basin ten miles south of Momence, Illinois, the ants are very similar to those of the other black oak forests on sand, but *Pheidole morrisi*, *Formica pallidefulva schaufussi* and *Formica sanguinea subintegra* are unusually abundant. The dunes are low and the vegetation consists of oak woods and meadows of mixed grasses.

Along the shore north of Waukegan, Illinois, the ants are again similar to those of the Indiana and Kankakee dunes except that *Formica neogagates* is considerably more abundant and the rare *Lasius latipes* was secured there. Almost all records of *Pheidole pilifera* were obtained from this station also. The vegetation is characterized by sand-binding grass, black oak ridges, Scotch pine and spreading marshes.

Within the various forest habitats are several strata, but only the subterranean and ground strata are important as places of abode for ants. They search in the trees for aphid honey-dew and capture much insect prey, but unlike tropical and subtropical species, seldom seem to build nests above the ground. Colonies either have galleries in the soil with craters or masonry domes at the surface, or are log inhabiting. Frequently, underground nests open beneath the protection of bark fragments, sticks or boards. Hypogaecic species are to be expected under stones or boulders. One colony of *Leptothorax* was found in the bark of a live tree, and this genus occasionally uses the fallen acorns of black oaks. The subterranean yellow *Lasius* forage actively above ground at Smith during the nocturnal period, and species of *Camponotus* are also abroad in great numbers at night.

The log niche is well occupied in forest and woodland, and runways may be excavated partly in soil and log. A number of stages in the process of wood decay can be recognized. Shelford designated four (1913, pp. 238, 246), while Talbot lists six and for the most part these may be adhered to. Stage 1 (dead tree still intact), Stage 2 (bark loosened), Stage 3 (sapwood soft), Stage 4 (heartwood soft), Stage 5



FIG. 5. Black oak dunes in Kankakee County near Momence, Illinois.
Photo by R. W. Miller.



FIG. 6. Beech-maple forest at Warren Woods near Lakeside, Michigan.
Photo by Ecology Class, 1940.

(log crumbling), Stage 6 (merging with soil). Though a single ant species may be present in more than one stage, the following list serves to show that in logs the optimum conditions for different forms vary directly as the wood disintegrates, and indeed, this process is often hastened by the ants themselves. *Crematogaster lineolata* and *C. l. cerasi* are common types in the early phases. *Camponotus herculeanus* spp. alone seem able to tunnel in live trees or fresh wood, and in logs all *Camponotus* remain until the wood is honeycombed but not collapsed. *Aphenogaster fulva* spp. and *A. tennesseensis* with *Formica fusca subaenescens* also are most frequent in the middle stages of the succession. There is a tendency for hypogaeic species (which regularly require a moist environment) to be present in the middle and late stages when the wood is wet and spongy. Examples of these are the *Lasius umbratus* group and *Ponera coarctata pennsylvanica* (Table II).

These stages in log decay are convenient categories, but instances are encountered where it is arbitrary to assign a stage as the process is a continuous one. Phases three, four and five are the most confusing, and different sections of a large log show varying degrees of decomposition. Savely (1939) describes a fairly close connection between the stage of decay and the number of years duration of the process, but one difficulty lies in the fact that the rate of disintegration varies decidedly with different woods.

The delineation of ant-plant communities can be ascertained from the accompanying tabular data. Since ants are closely associated with soil and are somewhat fixed in position by rather permanent nest locations, it follows that modification of the ground stratum by the plant cover automatically affects the tolerances of ant species. In the list presented below the communities are labeled by the ant names most characteristic of them. Common and widely distributed species are not considered good indices.

ANT-PLANT COMMUNITIES

Prairie-meadow-pasture: *Formica cinerea neocinerea* and *Myrmica lobicornis fracticornis* community.

Foredune-cottonwood: *Monomorium minimum* and *Pheidole bicarinata* community.

Coniferous dune: *Iridomyrmex pruinosus analis* and *Paratrechina parvula* community.

Black oak dune: *Formica pallidefulva* spp., *Aphaenogaster treatae* and *Leptothorax texanus* community.

Mesophytic dune ravine forest: *Formica truncicola obscuriventris* and *Lasius flavus nearcticus* community.

Mixed oak forest: *Prenolepis imparis* and *Stenamma brevicorne* community.

Oak-hickory forest: *Camponotus herculeanus pennsylvanicus ferrugineus* community.

Beech-maple forest: *Aphaenogaster fulva* spp., *Myrmecina graminicola americana* and *Leptothorax longispinosus* community.

Bog forest: *Myrmica brevinodis* spp. and *Dolichoderus* spp. community.

Floodplain forest: *Strumigenys pergandei* community.

Forest margin: This community appears to be too variable to have any ant species restricted to it. (See discussion of *F. ulkei*.)

Marsh: Has only sporadic colonies of ants and none characteristic.

Railway and roadside: These habitats may be considered special extensions of the prairie and forest margin communities.

The importance of sand versus clay in the Chicago Region is not neglected but the differences among vegetation types are emphasized.

In the later stages of plant succession the nature of the soil (so modified by the plant types) probably has a minor effect upon the distribution of ants. Many species are log or humus dwellers and are thus removed

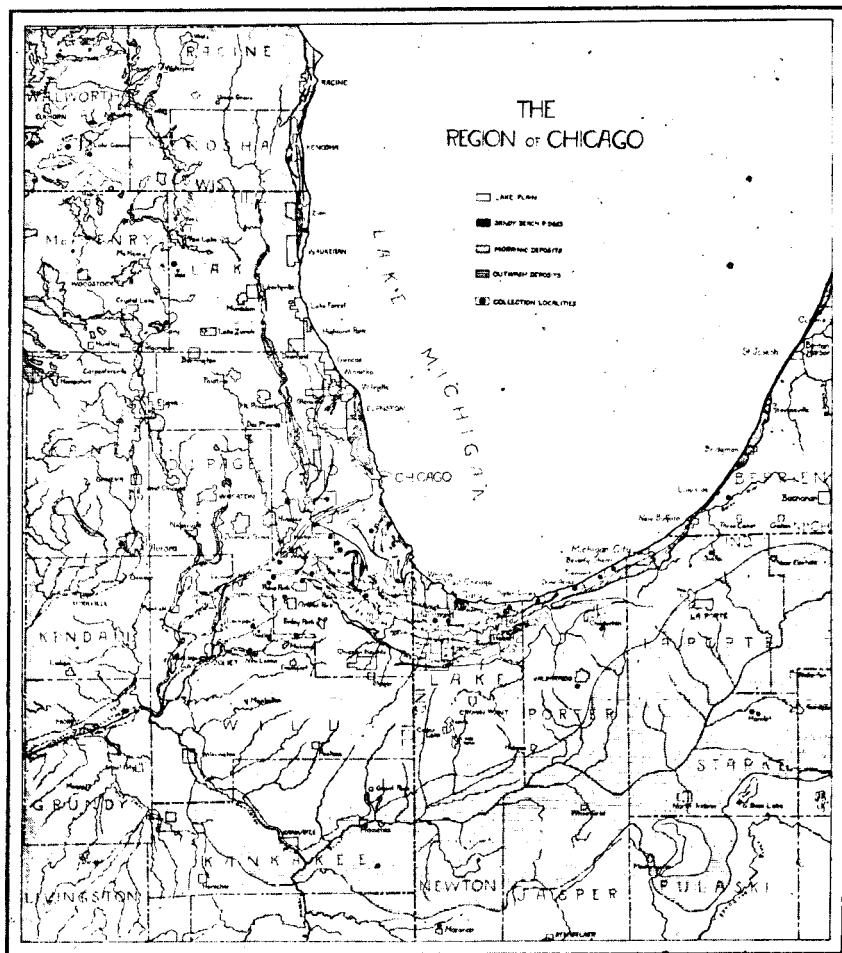


FIG. 7. The Region of Chicago. Permission has been granted to use this modification of "Plate I" from F. M. Fryxell's, "The Physiography of the Region of Chicago," published by the University of Chicago Press. (Three Rivers, Michigan, is too far east to be conveniently included on this map, and La Salle, Illinois, and Madison, Wisconsin, are too far west, but all are legitimately cited as localities for the region.)

from direct contact with the mineral substratum. Of the sixty-one ants present in black oak dunes and mixed oaks on clay, twenty-three species (37.7%) are common to both forests despite wide differences in soil. In comparing the sixty ants present in black oak dunes and

TABLE I—(Continued)

SPECIES	Prairie	Meadow	Pasture, Field	Forest margin	Foredune	Cottonwood dune	Jack pine dune	Black Oak dune	Mesophytic ravine	Oak Forest	Oak-hickory Forest	Beech-maple Forest	Floodplain Forest	Marsh	Bog Forest	Railway and Roadside	House	Log Stages	Under Stones, Logs, Wood, etc.	Abundance
46. <i>Camponotus caryae subbarbatus</i>								x				x						3, 4		RDDC
47. <i>Camponotus castaneus</i>								x										3	1	DDC
48. <i>Camponotus castaneus americanus</i>								x		x	x							2, 3, 4		AD
49. <i>Camponotus herculeanus ligatipennis noveboracensis</i>			x					x		x	x	x						2, 3, 4, 5	1	AD
50. <i>Camponotus herculeanus pennsylvanicus</i>								x		x	x							3, 4, 5		AD
51. <i>Camponotus herculeanus pennsylvanicus ferrugineus</i>								x		x	x							3, 4, 5		AD
52. <i>Formica ciliata chieria neochorea</i>			x																	
53. <i>Formica ciliatoides ciliatoides</i>			x																	
54. <i>Formica fusca fusca subaenensis</i>			x																w	
55. <i>Formica fusca fusca subsericea</i>			x																	
56. <i>Formica neogagates neogagates</i>			x															2, 3, 4, 6		AD
57. <i>Formica neogagates lasioides retula</i>			x															5		AD
58. <i>Formica neptulca</i>																				
59. <i>Formica pallidefulva nitidiventris</i>	x																			
60. <i>Formica pallidefulva nitidiventris fuscata</i>	x																		1, w	
61. <i>Formica pallidefulva schauinslandi</i>	x																		s	
62. <i>Formica pallidefulva schauinslandi incerta</i>			x																w	
63. <i>Formica rufa aggerans</i>																		3, 4	1	
64. <i>Formica rufa aggerans melanolica</i>																				
65. <i>Formica sanguinea aserata</i>																				
66. <i>Formica sanguinea rubicunda</i>																				
67. <i>Formica sanguinea subintegra</i>	x																	5	1	
68. <i>Formica sanguinea subintegra</i>																		4		
69. <i>Formica truncicola integra</i>	x																			
70. <i>Formica truncicola obscuriventris</i>																				
71. <i>Formica truncicola obscuriventris gymnomma</i>																				
72. <i>Formica ulkei</i>																				
73. <i>Lasius brevicornis</i>			x																1	
74. <i>Lasius claviger</i>			x																1	
75. <i>Lasius flavus nardicus</i>			x																s, l	
76. <i>Lasius interpres</i>																			s	
77. <i>Lasius latipes</i>																		2, 3		
78. <i>Lasius niger alienus americanus</i>																				
79. <i>Lasius niger neoniger</i>																				
80. <i>Lasius umbratus mixtus aphidicola</i>			x															2, 3, 4, 5	s, l	
81. <i>Lasius umbratus mixtus speculiventris</i>			x															4, 6	s, l, w	
82. <i>Paratrechina parvula</i>			x															3, 4, 5	1, w	
83. <i>Prenolepis imparis</i>																			s	
84. <i>Prenolepis imparis lesicaea</i>			x															3	1, w	
85. <i>Polyergus rufescens breviceps</i>	x																			
Total	8	9	18	17	7	5	12	47	15	37	18	25	18	5	15	4	2			
Percentage	9.4	10.6	21.2	20.0	8.2	6.0	14.1	55.3	17.6	43.5	21.2	30.0	21.2	6.0	17.6	4.7	2.4			

beech-maple forest on silt and clay, twelve (or 20%) are common to both despite wide differences in soil. The reduction in the percentage of common forms between these two habitats seems to parallel important differences in vegetational type. *Prenolepis imparis*, though noticeably dependent on the clay of morainic oak woodland for the construction of domed galleries, has been found also in the oak dunes. Oak forests, regardless of type, have the richest assemblage of species, and this might be traced to the variety of niches. Much humus is present, trees and shrubs add important strata, logs are numerous, yet openings appear where meadow conditions develop and there are even patches of bare earth.

TABLE II

	USE OF LOGS BY ANT SPECIES					
	1	2	3	4	5	6
Stage of decomposition						
Number of ant species	4	17	29	24	20	3
Percentage	10.0	42.5	72.5	60.0	50.0	7.5

TABLE III

	ABUNDANCE OF ANT SPECIES			
	A Abundant	C Common	U Uncommon	R Rare
Density of ant species				
Number of ant species	9	19	31	26
Percentage	10.6	22.3	36.5	30.6

GEOGRAPHIC ORIGINS

The upper Mississippi Valley is similar in species composition to the St. Lawrence Drainage and the North Atlantic States. Most of the ant species in Connecticut, for instance, are found at least as far west as Illinois, Indiana and Wisconsin, and others cross the continent. *Formica*, *Lasius*, *Myrmica*, *Stenamma* and *Polyergus* which are Holarctic, and *Camponotus* which is cosmopolitan, contain over half (48) of the species known for the area. Nevertheless, the vegetational transitions in the Chicago Region are matched by ant species or genera with overlapping ranges. Some western members of the above genera have spread into Illinois, and several species have migrated southward from the Canadian Zone. A noteworthy southern invasion is represented by thirteen genera (of the twenty-five listed for Chicago) which are tropical in distribution. Since some of these are large groups with many tropical forms described, the one or few species in each characterizing our fauna indicates that these genera are near the limit of their northern penetration. Illustrations of the zoogeographic trends are briefly outlined below. Consult Wheeler's works (1917b, etc.) for the distribution of North American Formicidae.

From the East:

Several eastern species seem to be rarer in the middle west.

Ex. *Formica exsectoides* and *Lasius (A.) claviger*.

Tetramorium caespitum (introduced from Europe).

From the West:

Formica cinerea neocinerea.

Polyergus rufescens breviceps.

Myrmica brevinodis brevispinosa.

From the North:

Formica ulkei.

Camponotus herculeanus ligniperda noveboracensis.

From the South:

Pheidole (t)

Solenopsis (t)

Crematogaster (t)

Monomorium (t)

Strumigenys (t)

Aphaenogaster

Leptothorax

Iridomyrmex

Dorymyrmex

Dolichoderus

Ponera

Proceratium

Stigmatomma

(All these genera are tropical; "t"—tropicopolitan.)

Myrmica brevinodis sulcinodoides Emery and *Formica perpilosa* Wheeler have been listed for the area by Talbot but I have not relocated them. *Camponotus caryae caryae minus* Emery is difficult to distinguish from *nearcticus* and may not deserve formal recognition. *Iridomyrmex humilis* Mayr was present at the University Laboratory in 1934 but it has not been seen in recent years.

In addition to the seventy ants recorded by Dr. Talbot, twenty-two others have been collected, and doubtless more remain undiscovered. The following keys modified from various papers by Wheeler (1903a, b, 1905, 1910a, b, c, 1913, 1916, 1922), Smith (1931, 1936) and Cole (1940), trace the species represented in the author's collection.

Formicidae

KEY TO THE SUBFAMILIES^a

1. Anal opening circular and terminal, usually bounded by a fringe of curved hairs (p. 469).....**FORMICINAE**
2. Anal opening a narrow slit, ventral in position..... 2
2. Pedicel composed of two segments; sting usually well developed (p. 460),.....**MYRMICINAE**
- Pedicel of only one segment..... 3
3. A marked constriction between the first and second gastric segments (p. 459).....**PONERINAE**
- No constriction between the gastric segments; anal slit transverse (p. 467),.....**DOLICHODERINAE**

Ponerinae

KEY TO THE GENERA

1. Abdomen strongly decurved and pointing somewhat forward (p. 460),.....**Proceratium**
- Abdomen of the usual shape (not decurved)..... 2
2. Mandibles triangular, teeth minute (p. 460).....**Ponera**
- Mandibles linear, teeth conspicuous and bidentate (p. 460).....**Stigmatomma**

^aKey to the workers. The subfamilies Cerapachyinae, Dorylinae and Pseudomyrmecinae are not represented in the Lake Region.

Proceratium Roger

Proceratium croceum (Roger).—The single record of this species was obtained by Mr. Henry Dybas near the periphery of the area. Its presence beneath dung appears unusual as it is expected to occur in old logs.

Localities: Hamlet, Ind. (Dybas).

Stigmatomma Roger

Stigmatomma pallipes (Haldeman).—In the few places where I have collected this ant it seems always to be restricted to woodland areas and to be either in logs or under them. Two records of its occurrence are with other ants or at least in their immediate vicinity, namely: *Lasius* (*A.*) *claviger* and *Formica ulkei*. One specimen was found in cow dung. None but isolated individuals have been secured in each case despite efforts to locate the nests.

Localities: Palos Park, Ill. (R. Wheeler, Gregg); Ogden Dunes, Ind. (Lowrie, Gregg); Hamlet, Ind. (Dybas); Three Rivers, Mich.

Ponera Latreille

KEY TO THE SPECIES

Color brownish black; external borders of mandibles straight (p. 460),

coarctata pennsylvanica Buckley

Color ferruginous yellow; external borders of mandibles sinuate (p. 460),

inexorata Wheeler

Ponera coarctata pennsylvanica Buckley.⁴—In contrast to *Stigmatomma*, this ant is very common in certain habitats. The greatest number of nests was found in deep woods where the galleries ramified under bark or beneath the moss covering old logs. In one instance, many colonies were taken from under flat stones in a pasture. Winged males and females can be obtained in the latter part of August and early September.

Localities: New Lenox, Ill.; Hadley, Ill.; Palos Park, Ill.; Orland Park, Ill.; Momence, Ill.; Waukegan, Ill.; Volo, Ill.; Carlé Woods, Ill. (O. Park); Hodgkins, Ill. (Miller); Chicago, Ill. (Miller); Chesterton, Ind.; Smith, Ind.; Starke Co., Ind. (Dybas); Lakeside, Mich.

Ponera inexorata Wheeler.—According to Smith, this ant ranges from "Costa Rica through Mexico into the southern section of the United States." Its presence so far north seems difficult to explain, but its distribution is as yet uncertain owing to the meagre records of its occurrence. Its yellowish color serves easily to distinguish it.

Localities: Lake Geneva, Wis. (Lowrie).

Myrmicinae

KEY TO THE GENERA

1. Antennae 6-jointed; head cordiform (p. 461) **Strumigenys**
- Antennae with more than six joints 2
2. Antennae 10-jointed, with a club composed of two joints (p. 461) . . **Solenopsis**
- Antennae 11- or 12-jointed 3
3. Postpetiole articulated to the dorsal surface of the gaster which is dorsally flattened and pointed at the tip (p. 461) **Crematogaster**
- Postpetiole articulated in the usual place at the anterior end of the gaster . . 4

⁴Unless otherwise stated, the third name in trinomials is subspecific.

LITERATURE CITED

- Burrill, A. C., and M. R. Smith. 1919. A key to the species of Wisconsin ants, with notes on their habits. *Ohio Jour. Sci.* 19: 279-292.
- Cole, A. C. 1940. A guide to the ants of the Great Smoky Mountains National Park, Tennessee. *Amer. Midl. Nat.* 24: 1-88.
- Cowles, H. C. 1899. The ecological relations of the vegetation on the sand dunes of Lake Michigan. *Bot. Gaz.* 25: 95-117; 167-202; 281-308; 361-391.
1901. The plant societies of Chicago and vicinity. *Bull. Geog. Soc. Chicago*, No. 2, pp. 1-76.
- Dreyer, W. A., and Thomas Park. 1932. Local distribution of *Formica ulkei* mound-nests with reference to ecological factors. *Psyche* 39: 127-133.
- Fryxell, F. M. 1927. The physiography of the region of Chicago. *Univ. Chicago Press*, pp. viii, 1-55.
- Fuller, G. D. 1914. Evaporation and soil moisture in relation to the succession of plant associations. *Bot. Gaz.* 58: 193-234.
1925. The vegetation of the Chicago Region. *Univ. Chicago Press*, pp. 1-27.
1934. The plant communities of the dunes. *Scientific Monthly* 38: 444-451.
1935. Postglacial vegetation of the Lake Michigan Region. *Ecology* 16: 473-487.
- Holmquist, A. M. 1928. Notes on the life-history and habits of the mound-building ant, *Formica ulkei* Emery. *Ecology*, 9: 70-87.
- Kennedy, C. H., and Mary Talbot. 1939. Notes on the hypogaecic ant, *Proceratium silaceum* Roger. *Proc. Ind. Acad. Sci.* 48: 202-210.
- Lowrie, D. C. 1942. The ecology of the spiders of the xeric dunelands in the Chicago Area. *Bull. Chicago Acad. Sci.* 6: 161-189.
- Park, O. 1929. Ecological observations upon the myrmecocoles of *Formica ulkei* Emery, especially *Leptinus testaceus* Mueller. *Psyche* 36: 195-215.
1930. Studies in the ecology of forest Coleoptera. I. *Ann. Ent. Soc. Amer.* 23: 57-80.
- 1931a. Studies in the ecology of forest Coleoptera. II. *Ecology* 12: 188-207.
- 1931b. The measurement of daylight in the Chicago Area and its ecological significance. *Ecol. Mono.* 1: 189-230.
1935. Studies in nocturnal ecology. III. Recording apparatus and further analysis of activity rhythm. *Ecology* 16: 152-163.
1937. Studies in nocturnal ecology. VI. Further analysis of activity in the beetle, *Passalus cornutus*, and description of audio-frequency recording apparatus. *Jour. Anim. Ecol.* 6: 239-253.
- Park, O., J. A. Lockett and D. J. Myers. 1931. Studies in nocturnal ecology. I. The climax forest. *Ecology* 12: 709-727.
- Park, O., and J. G. Keller. 1932. Studies in nocturnal ecology. II. Preliminary analysis of activity in nocturnal forest insects. *Ecology* 13: 335-346.
- Park, O., and O. Sejba. 1935. Studies in nocturnal ecology. IV. *Megalodacne heros*. *Ecology* 16: 164-172.
- Park, O., and H. F. Strohecker. 1936. Studies in nocturnal ecology. V. An experiment in conducting field classes at night. *Ohio Jour. Sci.* 36: 46-54.
- Park, T. 1929. Notes on the relationship between *Formica ulkei* Emery and *Solenopsis molesta* Say. *Ent. News* 40: 325-326.
- Pearson, J. F. W. 1933. Studies on the ecological relations of bees in the Chicago Region. *Ecol. Mono.* 3: 374-441.
- Peattie, D. C. 1930. Flora of the Indiana Dunes. *Field Mus. Nat. Hist. Pub.*, Chicago, pp. 432.
- Pepoon, H. S. 1927. An annotated flora of the Chicago Area. *Chicago Acad. Sci. Pub.*, pp. 554.
- Salisbury, R. D., and W. C. Alden. 1899. The geography of Chicago and its environs. *Bull. Geog. Soc. Chicago* No. 1, pp. 1-63. 2nd Ed. 1920.
- Savely, H. E. 1939. Ecological relations of certain animals in dead pine and oak logs. *Ecol. Mono.* 9: 321-385.
- Shelford, V. E. 1907. Preliminary note on the distribution of tiger beetles and its relation to plant succession. *Biol. Bull.* 14: 9-14.
1908. Life-histories and larval habits of tiger beetles. *Jour. Linn. Soc. London* 30: 157-184.
1911. Physiological animal geography. *Jour. Morph.* 22: 551-618.

- Shelford, V. E.** 1912. Ecological succession IV. Vegetation and control of land animal communities. *Biol. Bull.* 23: 59-99.
1913. Animal communities in temperate America. *Bull. Geog. Soc. Chicago* No. 5, pp. xiii, 1-368.
- Smith, M. R.** 1931. A revision of the genus *Strumigenys* of America, north of Mexico, based on a study of the workers. *Ann. Ent. Soc. Amer.*, 24: 686-710.
1936. Ants of the genus *Ponera* in America, north of Mexico. *Ann. Ent. Soc. Amer.* 29: 420-430.
- Strohecker, H. F.** 1937a. A survey of soil temperatures in the Chicago Area. *Ecology* 18: 162-168.
- 1937b. An ecological study of some Orthoptera of the Chicago Area. *Ecology* 18: 231-250.
1938. Measurement of solar ultraviolet in the Chicago Area. *Ecology* 19: 57-80.
- Talbot, M.** 1934. Distribution of ant species in the Chicago Region with reference to ecological factors and physiological toleration. *Ecology* 15: 416-439.
- Wheeler, W. M.** 1903a. A revision of the North American ants of the genus *Leptothorax* Mayr. *Proc. Acad. Nat. Sci. Philadelphia*, pp. 215-260.
- 1903b. The North American ants of the genus *Stenammina sensu stricto*. *Psyche* 10: 164-168.
1905. The North American ants of the genus *Dolichoderus*. *Bull. Amer. Mus. Nat. Hist.* 21: 305-319.
1907. Notes on a new guest-ant, *Leptothorax glacialis*, and the varieties of *Myrmica brevinodis* Emery. *Bull. Wis. Nat. Hist. Soc.* 5: 70-83.
- 1910a. The North American Forms of *Lasius umbratus* Nylander. *Psyche* 17: 235-243.
- 1910b. The North American ants of the genus *Camponotus* Mayr. *Ann. New York Acad. Sci.* 20: 295-354.
- 1910c. The North American forms of *Camponotus fallax* Nylander. *Jour. New York Ent. Soc.* 18: 216-232.
1913. A revision of the ants of the genus *Formica* (Linné) Mayr. *Bull. Mus. Comp. Zool., Harvard*, 53: 379-565.
1916. Guide to the insects of Connecticut. Part III. The Hymenoptera, or wasp-like insects, of Connecticut. Formicoidea. *Bull. State Geol. and Nat. Hist. Surv. Connecticut*, No. 22, pp. 577-601.
- 1917a. A list of Indiana ants. *Proc. Indiana Acad. Sci.*, pp. 460-466.
- 1917b. The mountain ants of western North America. *Proc. Amer. Acad. Arts and Sci.*, 52: 457-569.
1922. Ants of the American Congo Expedition. A contribution to the myrmecology of Africa. Part VII. Keys to the genera and subgenera of ants. *Bull. Amer. Mus. Nat. Hist.* 45: 631-710.